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No. 8

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No 6.

B. D. Malcott,
U. S. Geological Survey.

Sept. 3, 1882.

Moved out of Kanab
& camped 10 mi. S. S. W.
on the Kanab, Wash.
just north of low
Pennian cliffs.
Collected fossils
from the middle band
of limestone 5^{ft} x 6^{ft}.

Sept 4.

Went down the
Kanab, Capitan to
the upper Camb. l.
Collected a few

fossils with E.S.H.
& returned to the
Penn. cliff to
assist C.H.H.

7.
Rode 10 miles west
along Penn. cliff-
outcrop in search
of fossils with C.H.H.
Mr. Hayden made
sketch of uncon-
formity at ~~middle~~
of Penn. of

8 (3)
With C.H.H. collected
fossils in Penn. cliff-
C.H.H. sketching.

9.
With E.S.H. rode
to the east of camp
5 mi. in search
of water, (Chaseford)
and also took a
look at Penn. cliff-

10.
Moved camp to
lower Kanab field

~~Left the Johnson Cana
a light colored
shaly shan a
dip of 45° to the
cross bedded laminae.~~

~~35° 45°~~

~~measured by~~

~~Limestone Aug.~~

~~38° water made.~~

~~Locality about 3 miles
below Johnson's stone,~~

~~Rev. H. H. H.~~

~~25°~~

Sept. 11/82.

~~Went in to Kanab to attend
to Edwards & Telegraph to
Washington.~~

Sept. 12/82

~~Busy all day cutting
up beef for drying.~~

Sept. 13/82

~~With C. H. H. out on
the Penn in south
of Kanab, goh collect-
ing fossils.~~

~~The double band of
limestone extends~~

~~the double band of
limestone extends~~

several miles to the
east or about to
the mouth of the
Johnson wash below
the Shinarump cliffs.
They retain the
characters given
in the section of 1879
& the same fossils
are embedded in
them along 20 miles
of country.

Sept. 14

~~Attended~~ ~~to~~ ~~various~~

After breakfast, H. S. E. & H. C.
drove to head of
Cottonwood canon thence
to Lemay canon & Kando
to Kanab thro' the
Vermilion cliffs.

Sept. 15"

Rainy day, at Kando
& camp.

Sept. 16"

Moved camp to
Johnson canon.

Sept. 17"

A.M. Rode up Johnson
canyon to examine
cross bedded sandstone

(See fig. 4) and after ⁸
lunch moved on
to Navajo wells.

Sept. 18.

Crossed the Kaibab
Plateau to Horse Rock
valley. Camping at
Horse Rock Spring.
On the road to the
east of Navajo well
noticed Permian
limestone below
Shinarump conglomerate.
Fine place
for a section.

Going south from ⁹
where the road
enters the H.R. valley
the entire Permian
& portions of the
Toros are faulted;
diam before reaching
the Cambiferous.
Kaibab

Sandstone

cliffs

1000 feet

Permian

700 feet

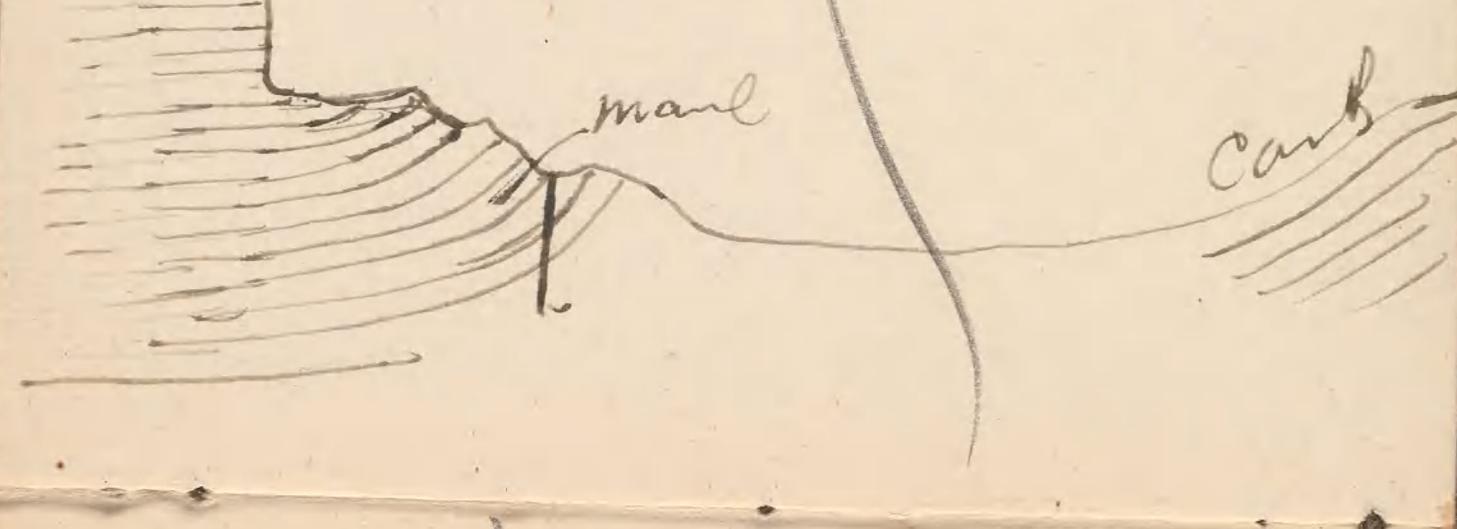
Sept. 19th 10

at Horse Rock Spring
the fish bed is well
developed in the Vermi-
cian cliff

a mile south of the
spring the cliffs dip
east at a low angle

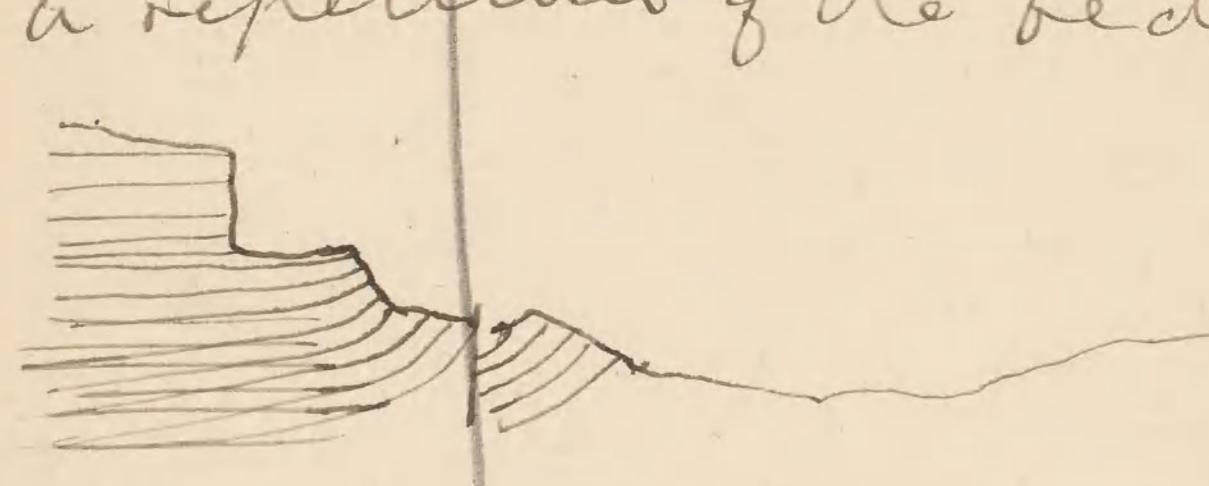
2°, near the summit.

at the base the strata
rise up to the west and
show a section -



From the character of
the beds there ~~are~~ probably
local faults causing

a repetition of the beds.



The broad floor of the
valley is quaternary
& no connection is
shown between it &
the carbonaceous.

Crossed the valley
& found the upper
Bellingshan beds of
the carbonaceous.

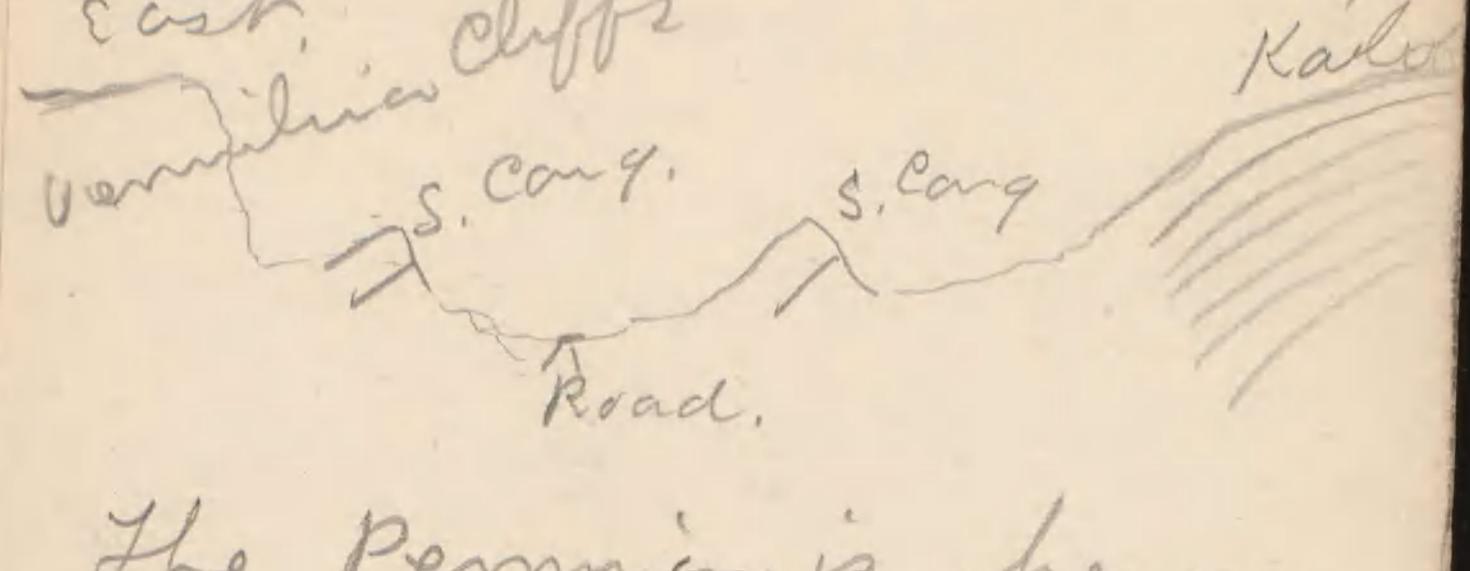
With Mr. Hayden 12
collected a few good
specimens.

Over the Bell-shaped beds
a peculiar deposit of
broken up fossils, small
angular ~~fragments~~ of the
limestone, ^{mostly} ~~mostly~~ broken
by buff colored limestone
occurs. Stone condition
of deposit, such
as noticed at same
horizon in Kanab canon
in 1879.

Sept. 20th

Started N. from House
Rock Spring. About
6 miles up the 13
valley two points of
Shinarump Cong-
appear in compara-
tively close relations
to the carboniferous
limestone on the west
side. so much so
that the Permian
is probably faulted
down at this point.
The Conglomerate
does not happen again
for 8 or 10 miles when
it forms a ridge
a hogback in the
valley & also an ^{out} ~~out~~

outcrop on the (14
eastern side.



The Pennin is here
faulted out in a
great ravine,
at the Buckskin wash
22 or 23 miles from the
Horse Rock Shg the
Pennin rests conformably
on the Carboniferous &
gives a section,
see fig. 16.

(15)

The eastern Kaibab
fault varies very
much. In places
there is scarcely a dis-
placement & in others
the downward part
be at least 1000 feet,
this depends on the
projection of the
great swells of the
Carb - limestone
line of vermillion cliffs
sh. wash

Sept 21st

16

On the N. side of the
Buckskin wash the
chocolate colored
Penin shales overlie
the cream colored
P- carb - l - and a
little less than 100
feet above (96) a
band of ~~as~~ yellowish
sandy limestone + "
l - shaly, occurs and
comes Myalina, Solvigia,
Discina nitida, Bascullicia
& fish plates Lepidies. At
one point this band
is 3 feet in thickness +

about 10 feet below (17)
a layer of sandy l -
3 - thick occurs.

These beds are overlaid
by Pettata of chocolate
brown colored shales
the thickness of which
owing to the faulting
along the line of the
Shinarump Cang - was
not determined. At
another point a
band of sandy l -
1 foot thick contained
great numbers of a

species of Basketellia (18)

This section appeared
to be about 150 feet
above the Camb. l.

The section of the
Permian is not unlike
that S. of Kanab. The
mudites underlying
the S. calc. are variegated
in color & banded. The
arenaceous-mud of a
furnished red & chocolate
color extend down to
the thin bands of l.
carrying the fossils
& the color of the
mainly beds & sandstone

to the Carboniferous (19)
to remain the same.

The Shumard Canyon
retains its characteristic
features & the strong
dark chocolate colored
sandstone beneath is
very noticeable. Below
this however, a belt
of light buff & gray
sandstone (25 feet) occurs
which at a distance
gives the impression
of a double band of
the conglomerate.

Continuing north a
little higher the Vermilion
cliffs fading to the

11

Canon of the Paria (20)
& the Town of " the
S - cany. & also the
Rim in beds & the
beds above the Cong-
are alternately faulted
or eroded out of sight.
The fault cutting
first the one & then
the other according
as the asian has exposed
the ridges in hollows
of the names in the
state.

Conglomerate

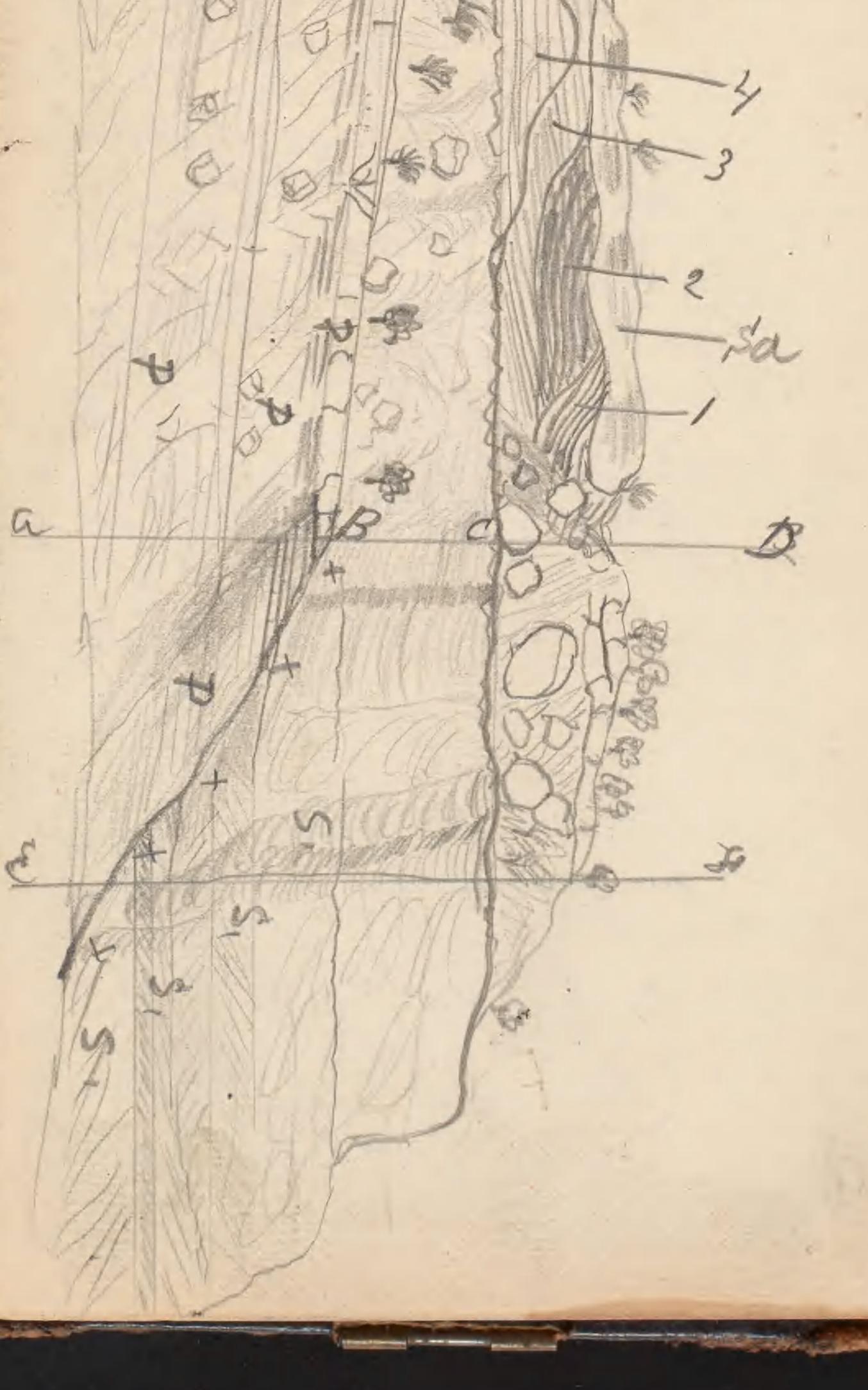
The same as on fig. 15.

The descent to Paria (21)
is thro' a wide canon cut in
the marlites off above the
S - cany. and the
lower beds of the
Vermilion cliffs. The
view of these beds as
lighted up by the
western sunlight is very
fine, excellin'g anything
of the kind I have yet
seen. Several hundred
feet of parti' colored
beds are eroded in
many beautiful forms
of buttes & canon, &
sculptured in smooth
round knobs & hogbacks

Sept. 22^a

22

1895. Dr. G. S. V. about $\frac{1}{2}$ mile up the
Canyon entering the
Paria canon at Paria
from the S. W. (at
which the road runs
to Kanab) on the N. side
of the canon a strong
unconformity is observed
between the chocolate
colored layers of the
Upper Permian and
the Serravallian Conglomerate
The following
section illustrates it,
Stake of Permian side
S. W. Dih. 80 N.



P.P.P. = the Permian (24)
 chocolate colored sand-
 stones as the occurs just
 beneath the Shinarump
 Crag - along miles of
 outcrop both in the
 Kanab region & north
 of House Rock valley.
 Along the line a-p it
 is 62 feet thick and
 is mainly a coarse
 sand with pebbles (silic)
 occur near the upper
 portion. At the
 N.E. end of this
 exposure there is
 an old cliff ~~xxxx~~
 indicating a struc.

surface erosion, (25)
 against which
 the claystone S.S.
 was deposited. The
 bottom of the was
 not reached owing
 to the talus & dip
 but 74 feet was added
 to the thickness giving
 136 feet to the Shina-
 rump at the point.
 To the N.E. at O. the
 Shinarump is still
 thinner than at A-B,
 not being over 40
 feet.
 Above the Shinarump
 at 1. 2. 3. 4. the

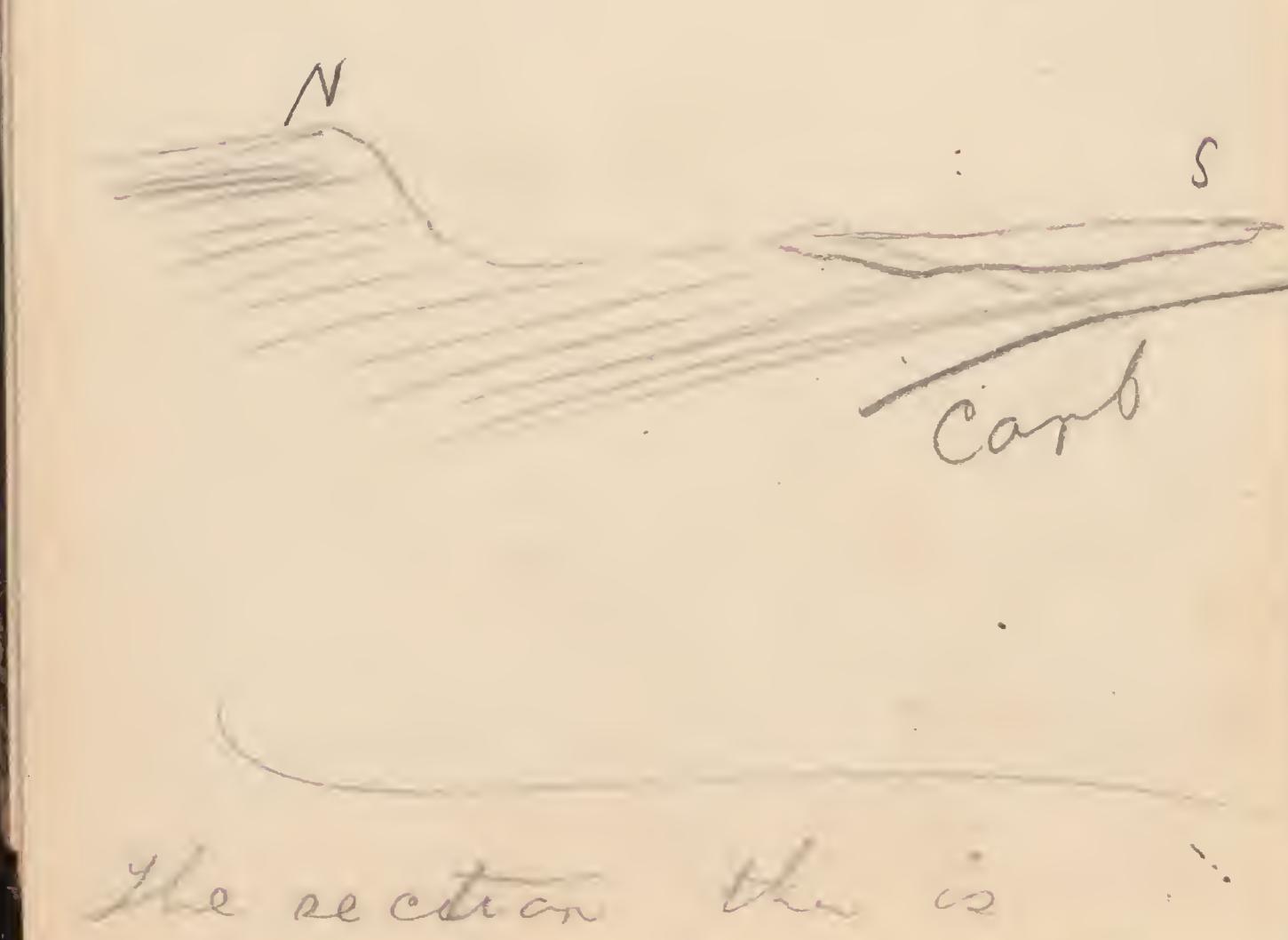
16

unconformity of ²⁶
deposition of the
marks is beautifully
shown & on this
the deposit 3d. is
a conglomate of
pieces of sandstone
silicified wood and
coarse sand. This
is of local deposition
as only a short
distance to the east-
ward the marks
rest directly on the
light colored shiv-
amph.

The line of strike
of the old Permian
cliff is N. W. & S. E. ²⁾
& can be traced
plainly a half mile
to the N. W. where
another canon cuts
thru it & also to
the S. E. where it
is cut by the
opposite side of
the canon in which
a sketch is made.

About 200 feet of
the upper Permian
is exposed at the
deepest cut in the canon
from point to point

of the Vermilion 28
cliff caused by the
elevation of the strata
towards the Kaibab
plateau from Ponca



The section this is

1. Brown mottled with 29,

massive brown, chocolate

colored sandstone

bed above.

200 ft

2. Sh. and

40 to 130 ft

3. Mottled Brown ad. 0

0 to 50 ft

4. Variegated mottles.

500 "

measured 493. feet

5. Reddish brown ad.

to fish bed

75 to 80 feet.

Vermilion cliff about
that over 150 feet to the
white cliff.

S.E. of the point where (30)
 the sketch is as taken the
 strata of the Vermilion
 cliffs dip N.E. 15° and
 the section just taken
 is beautifully shown
 down thro' the mauls
 (4.) and to the massive
 brown ad. bed capping
 the Permian. The mauls
 rest directly on this
 bed & there is no
 Shinanukh coring -
 present on its upperpart
 ad. Beneath the
 massive massive br
 ad. the succession of

mauls etc, is the (31)
 same as beneath the
 Corng. These beds
 present many features
 showing shallow
 water origin.

Ripple mauls, local
 unconformities of bedding,
 mud cracks & tracks
 of Gastropods &
 annelids.

The thinning out
 of the Shinanukh
 south of the Permian

Cliff is a feature ³² connected with the topography at the close of the Permian and as the Shinarump is thin all along Horse Rock valley & north it leads to the view that the elevation of the Kaibab was going on at that time.

Sept. 23d /82

Conform to 27(a). ³²

To the west of the point from which the sketch was taken, the conglomerate thins out and lavender colored marls come in between it & the massive ~~bed~~ bed, & locally there is a second light gray coarse sandstone about 50 feet above the 1st. This same feature also occurs about 20 miles to the S.E. in the N. end of the H. R. Valley, occurring along under the Unkar a cliff toward Kanab the Shinarump is only seen

occasionally as a 34
 gray sd. coming in
 on top of the massive
 br. bed. At the east
 base of Cone point
 the double bed of
 sd. comes in again
 for a little way &
 then for some distance
 the Shnambah is
 entirely absent.

The Shnambah is
 not seen again
 until the west side
 of the great butte at
 the mouth of —
 — can be seen
 reached. Here it
 is developed as
 a bed about 20 (35)
 feet thick and
 rests on the massive
 br. sd. bed. The
 latter bed is not
 always present
 where the can is
 absent, as the
 upper members rest
 on those below,
 with the exception
 however of the
 locality near Paria
 the massive br.
 sd. bed was always
 seen here at the
 can. It varies in
 thickness as the result of a
 slight erosion in

the open surface. 36

On west to Kanab
and beyond the
cliff is unbroken except
by recent erosion or
faulting.

Sept. 24th — Sunday
(Navajo Wells.)

In looking over Mr.
Gilbert's section at the west
Ponca creek I find that
he mentions the thinning
out of the Shinumoah
Conglomerate from 15
to 0, feet & that the
Cong- rested on the eroded
surface of the gypsiferous
clays below. In h.
175 he refers this to the
erotion of the current
spreading the Cong- 37

In many instances this
is undoubtedly correct
as is shown south of
Kanab, but the cliff
at Ponca I would attribute
to aerial erosion and
not to the current alone.
The absence of the
Shinumoah Cong- on
the line of the Kaibab
uplift is reasonably accounted
for by the theory mentioned
in h. 32. of this notebook.

Fossil localities below
Shinumoah Cong. mentioned
by Gilbert & Howell p. 176.
h. 200.

Ponca Cong. h. 177.

Marvin h. 213.

Sept. 25/82 38

Endeavored to get a section from the Carboniferous up to Shumard but could not do so satisfactorily. East of Navajo well 5 miles. C.H.H. Collected a lot of fossils in the Pennia l. bed is here most strongly developed in the upper bed. Aesthia for a time.

Also found a few b) poor fossils in the Pennia Carb.

Sept. 26,

Went in to Kanab to rest & make shelter tent etc.

Oct. 1st.

Moved camp to lower lateral field.

Oct. 2nd

With C.H.H. collected a lot of Pennia fossils in the l - south of Kanab gap 6 miles. Found Goniatites, Natilus etc. Found on these beds

Oct. 3d 40

Rode along Shinarump
cliff & w of Kanab
gap.

Noticed portion
of silicified water
was tree 3 feet
in diameter.

Measured conglom-
erate with tape line
& found it to be
47 feet on e. side
Kanab gap.

Noticed many traces
of coarse fucoids
and also annelid

boring in the (41)
sandstone immediately
over the conglomate

Oct. 4th

Moved camp to
Pipe Spring.

Noticed a reddish
frame of fine bister
in Penn. clay's about
300 feet below Shinar-
ump conglomerate,
3 mi. N. Kanab wash.
No fossils.

Oct. 5

With E. E. H. collected
a lot of Pennian

Fossils 7 miles (42
s.s. Pipe Spring. There
appears to be but one
stratum of limestone 3 or 4
feet in thickness.

Has outcrop of
Pennia in which
has been uninterrupted
from the Kanab wash
crossing except by
a few places of erosion
is cut off s. of the spg.
by the Lang valley
fault & the Shin-a-
ump canyon is let
down almost against

it
s.s.
shin

43

S.E.

shin

Penni

Section marked a maf.

A strongly marked
unconformity by erosion
is shown beneath the
thin-shelled cliff s.s. w.
of Pipe Spg. The brown
chocolate Pennia
sandy shales are cut
into 30 feet and the
irregular line is
shown in several places

shin

Oct. 6

44

With E. C. H. & C. C. C.
collecting fossils
in Permian l. at
same locality as
yesterday 9 mi south
Pipe Spring.

Oct. 7th

Section of Permian
S.S.W. of Pipe Spring

Start of 15 in S.S.W. of Pipe Spring
1) Estimate of sandstone
(Brown) & Anaceous &
gypsiferous clays &
fossil bearing l.

150

2. Shaly - light col. (45)
l. - carrying numerous
fossils. St. N. 75° S. 1/2 E
Myalma. Murchison
etc. etc. 5 feet.

3). Brown sandy clays

with more or less
gypsum.

245 "

4) light chocolate brown
alternately with
drab, overaceous &
gypsiferous clays.
Drab. 95- 335

5) Brown, chocolate col.,
passing into Drab - gyp
clay shale & d. with
numerous layers of
sd made up of shaly

laminated layer (46

Sept 1st 1890. sec. 287,

Shumard Crag.

to clear weather ⁶⁵
summit layers.

The distance from
the Camb - l - to
the Pennin is
mainly a level
plain so the thick-
ness was estimated
thick based on that
150 feet is wider
rather than over
the true thickness.

The upper part in 47
of No 4 is a dark
colored arenaceous
clay passing into
sandstone near the
top. Gypsum is found
throughout 4 and often
finds thin layers
 $\frac{1}{4}$ to 1^{1/2} in thickness
Retired to home of the 8th

See Note book No
7 for interval

Note on Permian (48
fauna

The peculiar fauna of the Permian is undoubtedly owing to the physical conditions during the deposition of the sediments. A sea depositing a mixture of clay and sand & only clear locally for the deposition of an ~~intra~~ limestone

on a sandstone would be only a few of the growth of forms capable of living ~~under~~ such conditions and the *Mytilus* & *Cardium* families are represented and the former largely developed. Both of these are represented in the strong saline waters of the Caspian sea at present and we also noticed them in the muddy &

arenaceous deposits (50.
of the lower portion
of the Aubrey group.

In the Permian l-
Brachiopods occur but
they are exceptional
& probably spread
from some locality
where limestones
were in catenular
deposition. The
subject of the origin
of the Colorado Permian

fauna is one of (51
interest & will proba-
bly be found to the
eastward of the
Colorado river.

In studying Permian
fauna refer to the
fauna just above
the Aubrey l., as
it possesses some
points in common.

"Boxes sent in from
Milford. Utah.

To No 17. sent from
Nevada

No 17.

10. PKg. Permian.

7 " Fish (Trias)

~~No 18)~~

21. PKg. Permian

" 19) 8. PKg. Camb.
6 " Fish (Trias)

" 20) 14. PKg. Camb.

" 21) 17 " "

" 22) 10 PKg. Camb.

" 23) —

" 24) 14. PKg. Lithologie
Grand canyon

" 25) 14. Fanti fossils
ditto

" 26) 14. Lithologie
ditto

27. 4. Lithologie
II. Fossile.
Grand Cava

Penni section
No. 3.
Distance 7015 feet.
Rise $\frac{63 \text{ feet.}}{142} \overline{245}$

Distance 1000. ft
Rise $\frac{20}{20}$

Distance 5250.
 $\frac{120}{380}$

840.

2871	130	
580	265.	
867.		
220		
66	26	260.
280.	6	75
		335
	150	

Base of Shinnamh in hollow

No 1. 5450.

" 2 ~~5800~~

Ditto on main Choc layer

No 1. 5500 5475

" 2. ~~5800~~ 5500,

" Summit of Cong.
No. 1. ~~5500~~ 5550
" 2. ~~5800~~ 5550

26

5

264

155

22

22

187

182

245

335

285

867

1

1430.

2150.

12696

58

62 feet above Cong.

13 104 88

68 184 7.

9 23 +

77 115

62 115

136. 70

87

55

435

58

493

Marl, 85. 12.0

1 - 5475. 174

1 - 6100 230

625

600.

25



